

## Magnetomechanical damping in textured polycrystalline Tb<sub>0.76</sub>Dy<sub>0.24</sub>

Single crystals of Tb-Dy alloys exhibit "giant magnetostriction" with maximum induced strains as large as one percent. Polycrystalline Tb-Dy materials, on the other hand, have many possible interactions between microstructural stresses and magnetic domain structures. Measurements are reported on mechanical energy dissipation of polycrystalline Tb<sub>0.76</sub>Dy<sub>0.24</sub> at 77 K, plane cold-rolled to induce crystallographic texture. Large mechanical hysteresis was observed in the stress-strain curves below the Curie point of the material, whereas negligible hysteresis was found above the Curie point at room temperature, thus confirming the magnetomechanical origin of the observed behavior. Cyclic stress-strain curves from zero to 25 MPa exhibit approximately 20 % dissipation of the applied mechanical energy. Above 25 MPa, the hysteresis decreases substantially, indicating saturation of the stress-induced magnetic domain alignment. The figure shows such a hysteresis loop measured at 77 K. Also shown are three minor loops, centered about strains of 120, 240 and 400 ppm. The minor loops show a smaller fractional energy dissipation, but also show an increase in the effective elastic modulus. The results are discussed in terms of magnetic domain rotation under applied stress.